

### ABSTRACT OF THE DISCLOSURE

The present invention provides methods and assembly units for the construction of nanostructures. Assembly of nanostructures proceeds by sequential, non-covalent, vectorial addition of an assembly unit to an initiator or nanostructure intermediate during an assembly cycle, a process termed “staged assembly.” Attachment of each assembly unit is mediated by specific, non-covalent binding of a single pre-determined joining element of one assembly unit to a complementary joining element on a target initiator or nanostructure intermediate. Each interaction of a joining element is designed such that the joining element does not interact with any other joining element of the assembly unit. Self-association of the assembly unit is therefore obviated: only one assembly unit can be added at a time to a target initiator or nanostructure intermediate.

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